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ROUGHNESS DISCRIMINATION TEST DEVELOPMENT 1960-61

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Previous reports (Nolan, 1960; Nolan and Morris, 1960) have described efforts in the development of a test of roughness discrimination to be used as a possible predictor of readiness to learn to read Braille. Earlier versions of this test have suffered several weaknesses among which were low reliability, insufficient range of discrimination among subjects, and a high level of difficulty for the very young. The research reported here describes efforts to overcome these weaknesses.

Procedure

The 1960-61 version of the test contained 75 test items as in the previous version. However, the item format was radically changed. The revised items consisted of 12.5" x 3.5" cards upon which were mounted four pieces of sandpaper 2" square. Three squares of sandpaper were of equal grit size while the fourth was of a larger grit size. The task for the subject was to feel the four squares and identify the square that felt rougher or different from the other three. Increasing the stimuli per item from the two in the previous version of the test to four in the present version was for the purpose of reducing the effects of guessing upon test scores as well as increasing the range of variability possible among subjects.

As before, the 18 grit sizes used ranged from 24-600. On no item were grit sizes compared that were more than 5 grades apart. The serial order of the various combinations of grit size as well as the position of the rougher square within items were randomized using a table of random numbers.

All subjects were tested individually with testing time being approximately 15 minutes per subject. Immediately prior to actual testing each subject was

shown a sample card with exaggerated differences in roughness between the odd square of sandpaper and the identical squares. If, after inspecting the sample, the subject, upon questioning about possible differences among the squares, responded that one square felt different, the task was explained and testing begun. In the event the subject was unable to respond knowingly to the sample, the differences were pointed out to him and he was shown a second sample item to check his understanding of the task. Once the subject appeared to know the task, testing was begun and items presented as rapidly as the subject could respond to them. Responses were recorded on a form designed for that purpose.

Subjects

The subjects were 140 children enrolled in the Ohio and Kentucky Schools for the Blind. Children in Ohio were tested in October 1960 and those in Kentucky were tested during January-February 1961. The children were all Braille readers or potentially so from the following grades:

1.	Kindergarten	7 girls and 10 boys,	ages 71-108 months
2.	First	12 girls and 17 boys,	ages 73-106 months
3.	Second	13 girls and 19 boys,	ages 83-129 months
4.	Third	21 girls and 22 boys,	ages 95-144 months
5.	Fourth	11 girls and 8 boys,	ages 105-170 months

Results

Results obtained for this revision of the test parallel those obtained with previous versions with the exception that the range of test scores is greater. Grade means, standard deviations, and differences among grade means are presented in Table 1. Mean scores for grades increased progressively with grade level. Analysis of variance reveals that while the kindergarten and 1st grade means are not significantly different, they do differ significantly at the .01 level of confidence from all other grades.

TABLE 1

GRADE MEANS, STANDARD DEVIATIONS, AND SIGNIFICANCE

OF DIFFERENCES AMONG MEANS

Higher Grade Mean Minus Lower Grade Mean					Mean	S. D.	N
Grades	1	2	3	4			
K	8.7	21.3*	24.2*	27.2*	29.4	8.2	17
1		12.6*	15.5*	18.5*	38.1	10.3	29
2			2.9	5.9	50.7	12.1	32
3				3.0	53.6	10.3	43
4					56.6	11.8	19

* Significant at the .01 level of confidence

The rate of improvement in ability to discriminate differences in roughness appears to begin to slow down at the second grade level. However, wide individual differences in this ability are found in grades 2-4. These factors are illustrated in Table 2.

TABLE 2

FREQUENCY DISTRIBUTIONS FOR SCORES OBTAINED IN EACH GRADE

Score Category	K	1	2	3	4
15 - 19	2	2	1		
20 - 24	3	2			1
25 - 29	5	1	1	1	
30 - 34	2	5	3	2	
35 - 39	3	5	1	3	1
40 - 44	1	4	3	2	1
45 - 49	1	6	3	7	1
50 - 54		4	4	2	2
55 - 59			8	9	1
60 - 64			7	14	8
65 - 69			1	3	4

The 1960-61 revision of the test proved to have acceptable reliability. The split-half reliability coefficient corrected by the Spearman-Brown formula was .92. The correlation between chronological age and test score was .33 and the correlation between mental age and total test score was .45. Both of the coefficients

are significant beyond the .01 level of confidence.

Discussion

The present version of the test appears to possess adequate reliability and range of variability of test scores. The task involved is simple enough that most blind kindergarten children can understand it. The low but significant correlations with chronological age and mental age indicate that, while these factors are related to ability to discriminate roughness, they account for only a small amount of the variation in individual test scores. Therefore, it would appear that the test may be measuring a factor that is intrinsically tactile.

The next step is to determine if scores on the test are related to ability of children in the primary grades to learn to read Braille. Present plans call for two estimates of validity to be made. One attempt will relate the scores obtained on the test by second grade children to their current ability to read. A second attempt will relate scores obtained on the test by first grade children at the beginning of the school year to measures of their ability to read near the end of the school year. This latter attempt will test the predictive validity of the test.

Summary

One hundred-forty Braille readers in grades kindergarten through four were administered a test of roughness discrimination. Group means increased progressively with grade level, however, rate of increase dropped considerably beginning with the second grade level. Low significant correlations were obtained between test score and both chronological and mental age.

References

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